Demonstration of a New, Multi-Function, Nondestructive Pavement Testing Device

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Outline

1. Overview of Rolling Dynamic Deflectometer (RDD)
   - Emphasis of Presentation is Deflection Measurements

2. Present New Profiling Device
   - Called Total Pavement Acceptance Device (TPAD)
   - Multi-Function Device

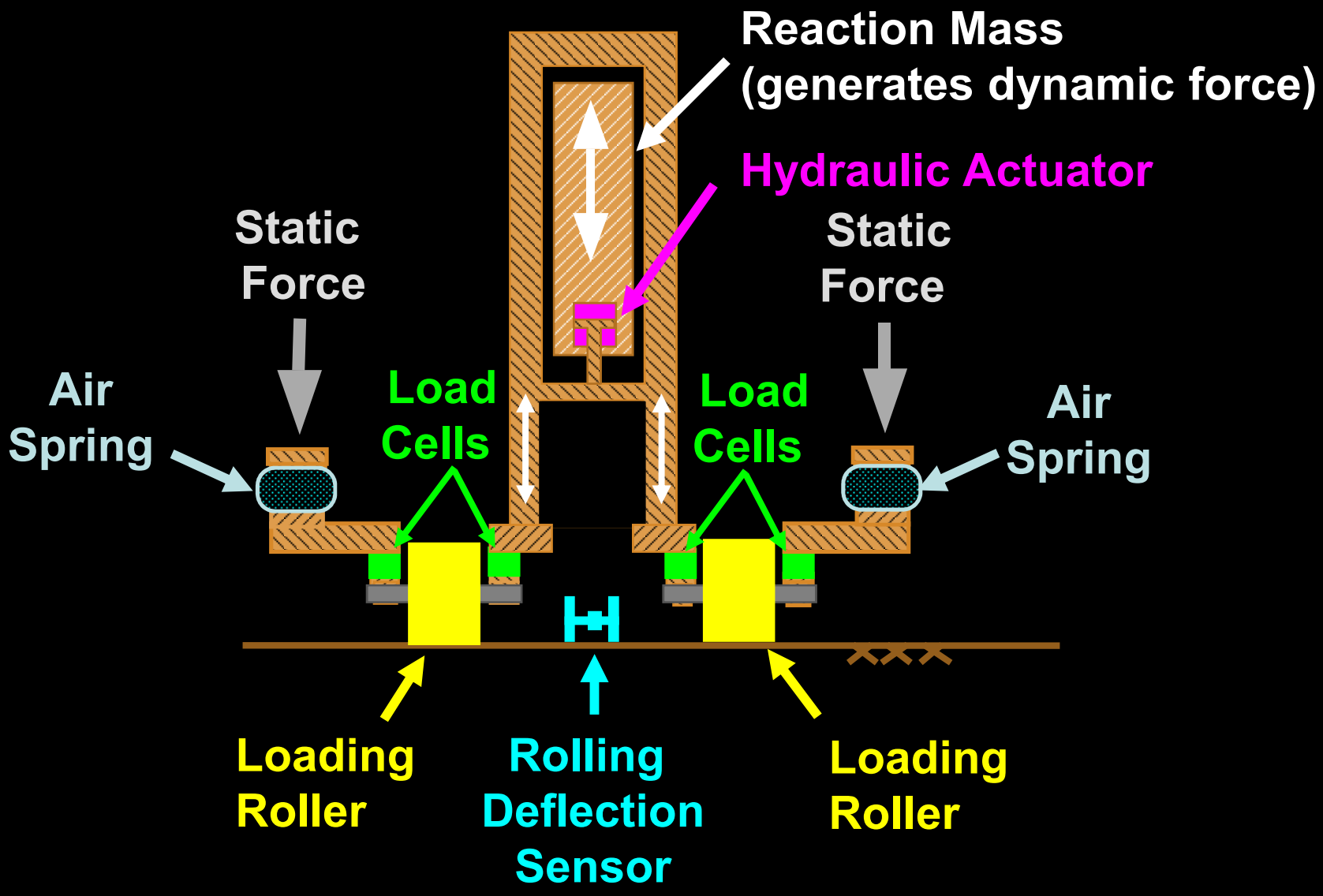
3. TPAD Testing at TxDOT FSF in Austin
   - Jointed Concrete Pavement Testbed
   - RDD Deflection Profiles

4. Concluding Remarks

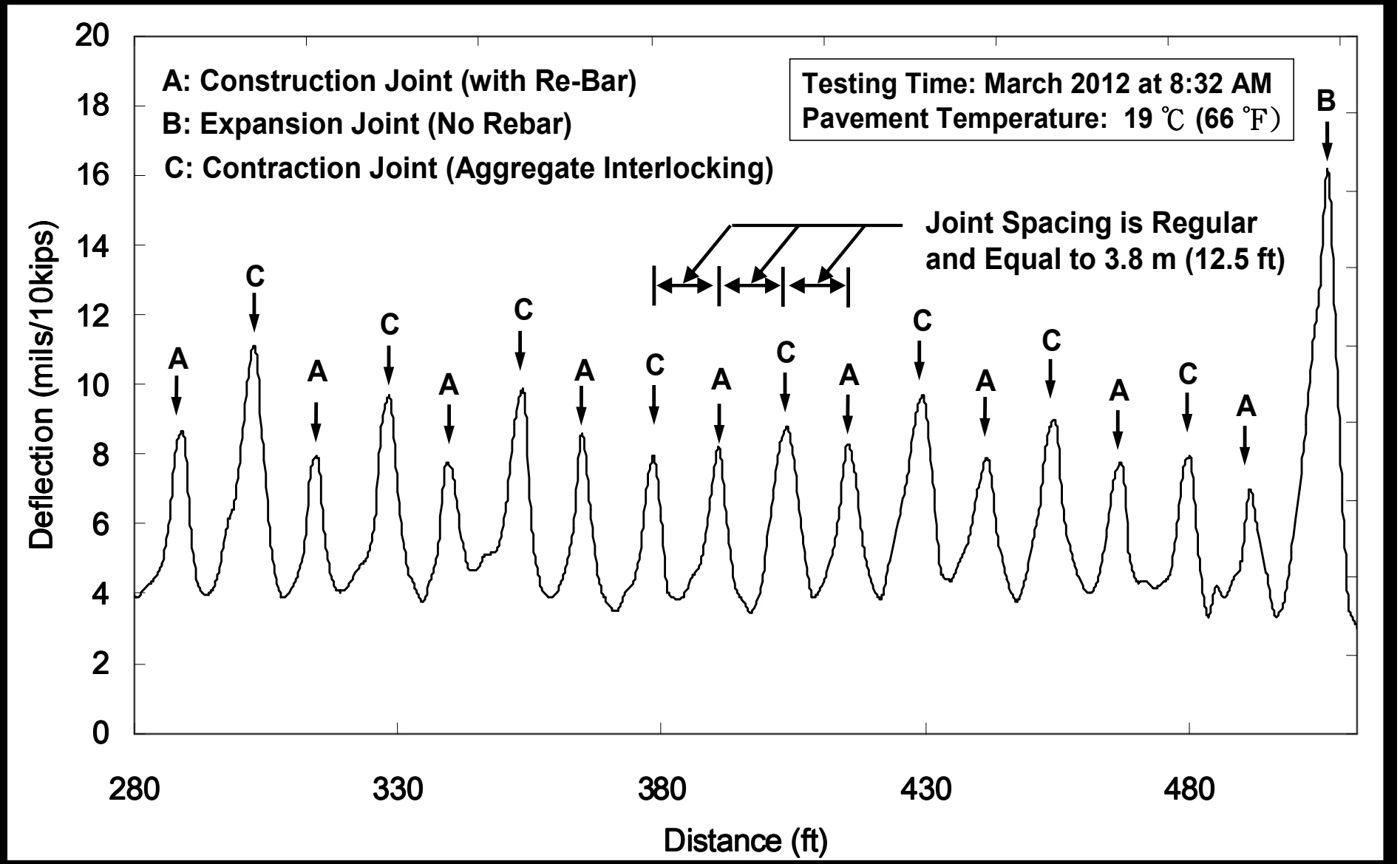
1. Overview:
Rolling Dynamic Deflectometer (RDD)

- Mobile platform
  - moves continuously along pavement
  - two loading rollers apply dynamic loads to pavement
  - multiple rolling sensors measure resulting dynamic deflections

Cross Section of RDD



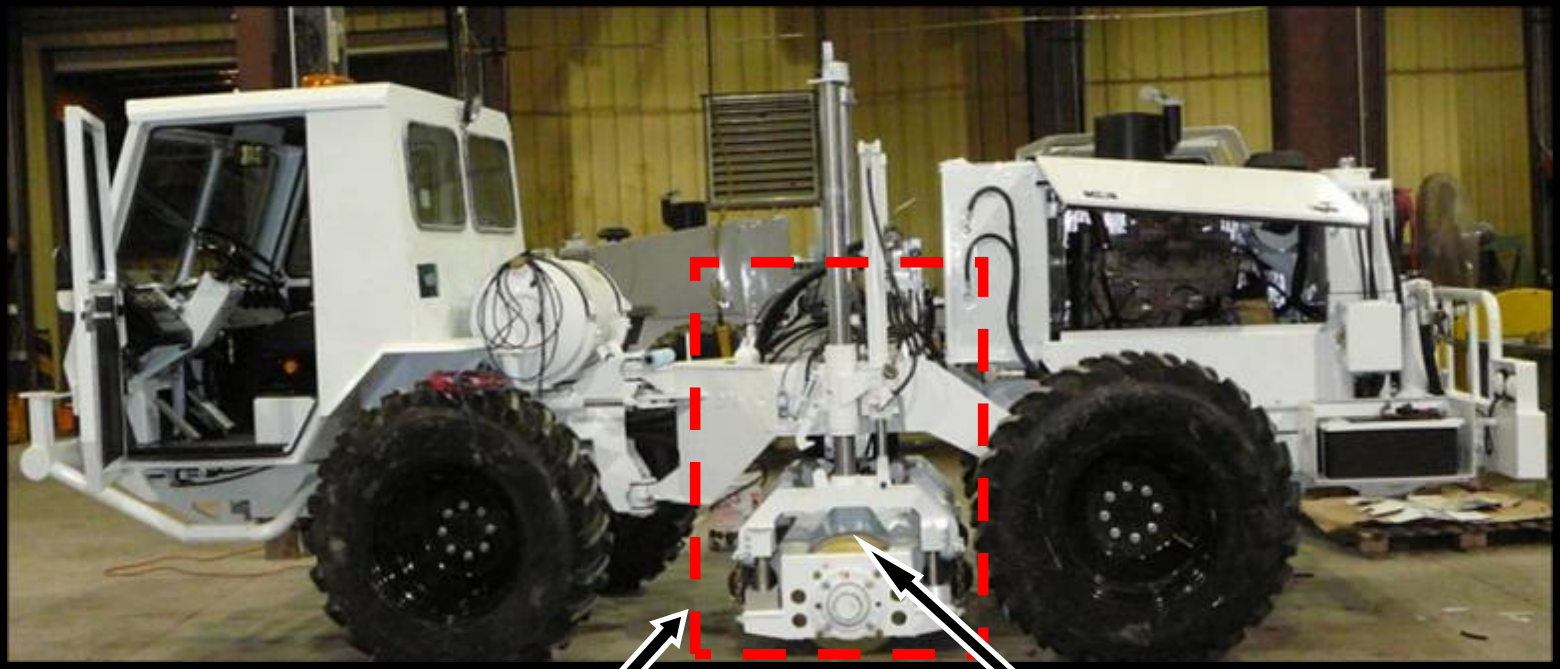
Continuous Deflection Profile



2. New Profiling Device

- Total Pavement Acceptance Device (TPAD)
  - Project-level studies
  - Continuous testing at 2 to 3 mph
    (Goal is to increase testing speed)
  - Multi-function device
- Testing Functions
  - RDD measurements
  - Ground penetrating radar (GPR)
  - Distance measurement along pavement (DMI)
  - High-precision differential GPS
  - Pavement surface temperature
  - Digital video imaging of pavement

TPAD Mobile Platform: Adapted from a Minivibe

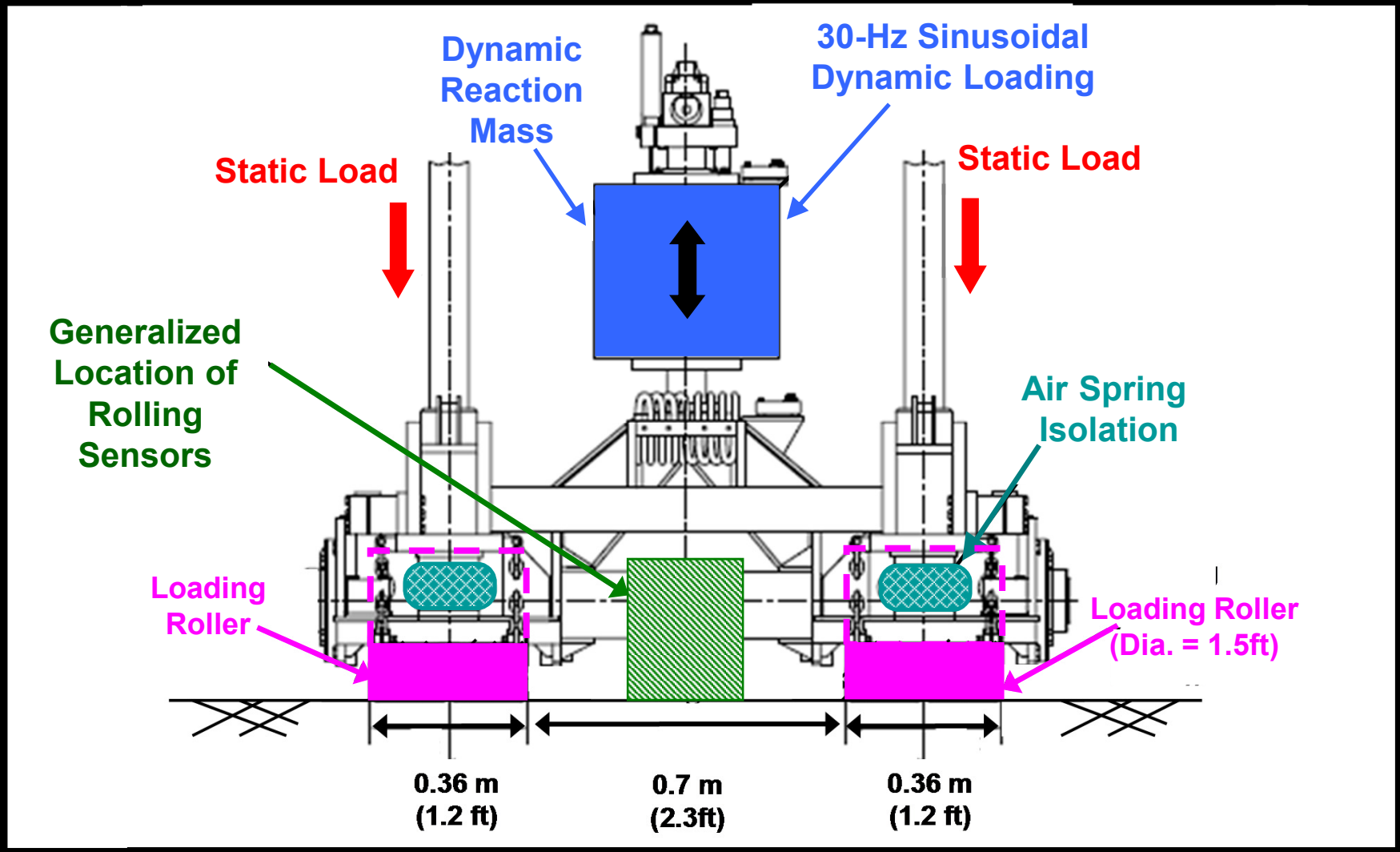


Cross-Sectional View of Pavement Loading System Shown in Next Slide

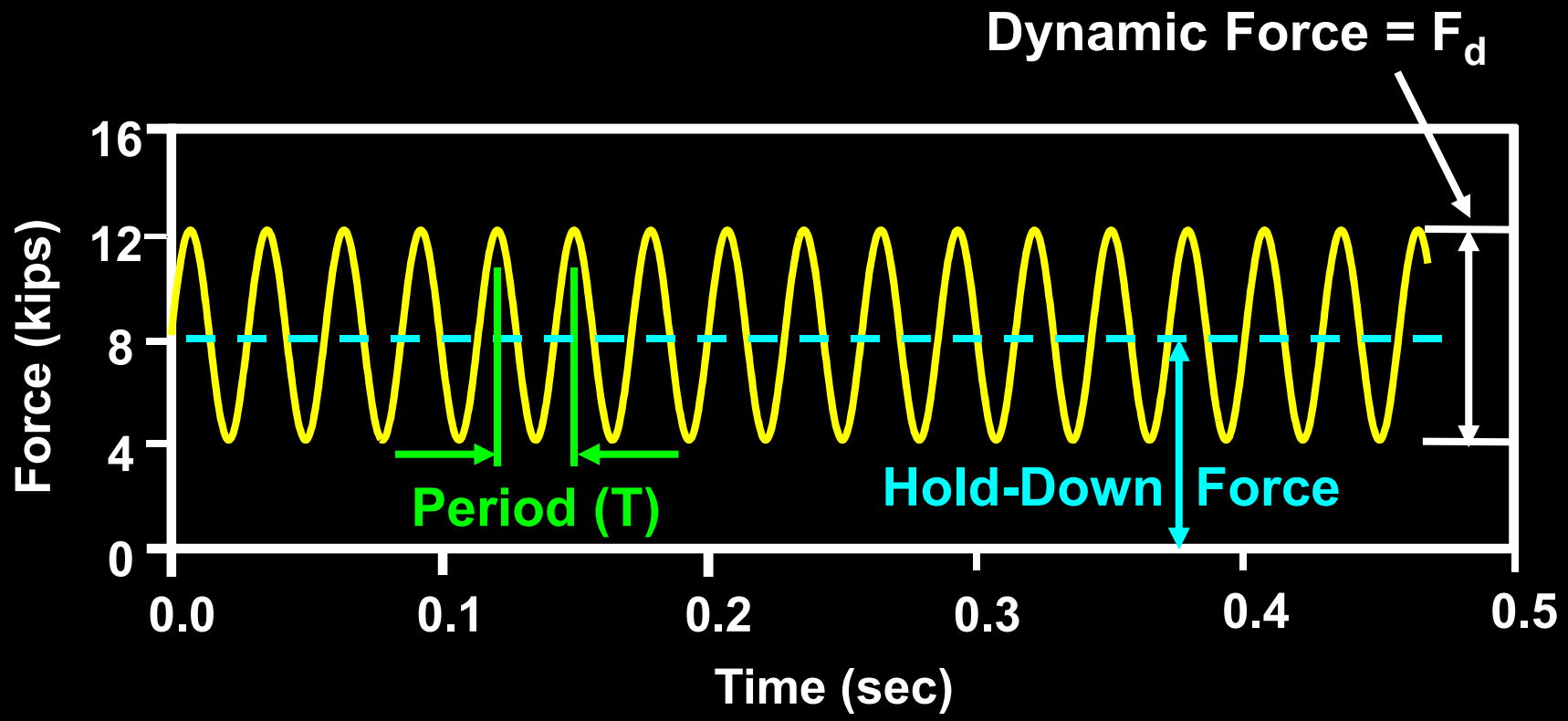
Loading Roller

* Note: Much open space beneath frames.

Cross Section of TPAD Loading System



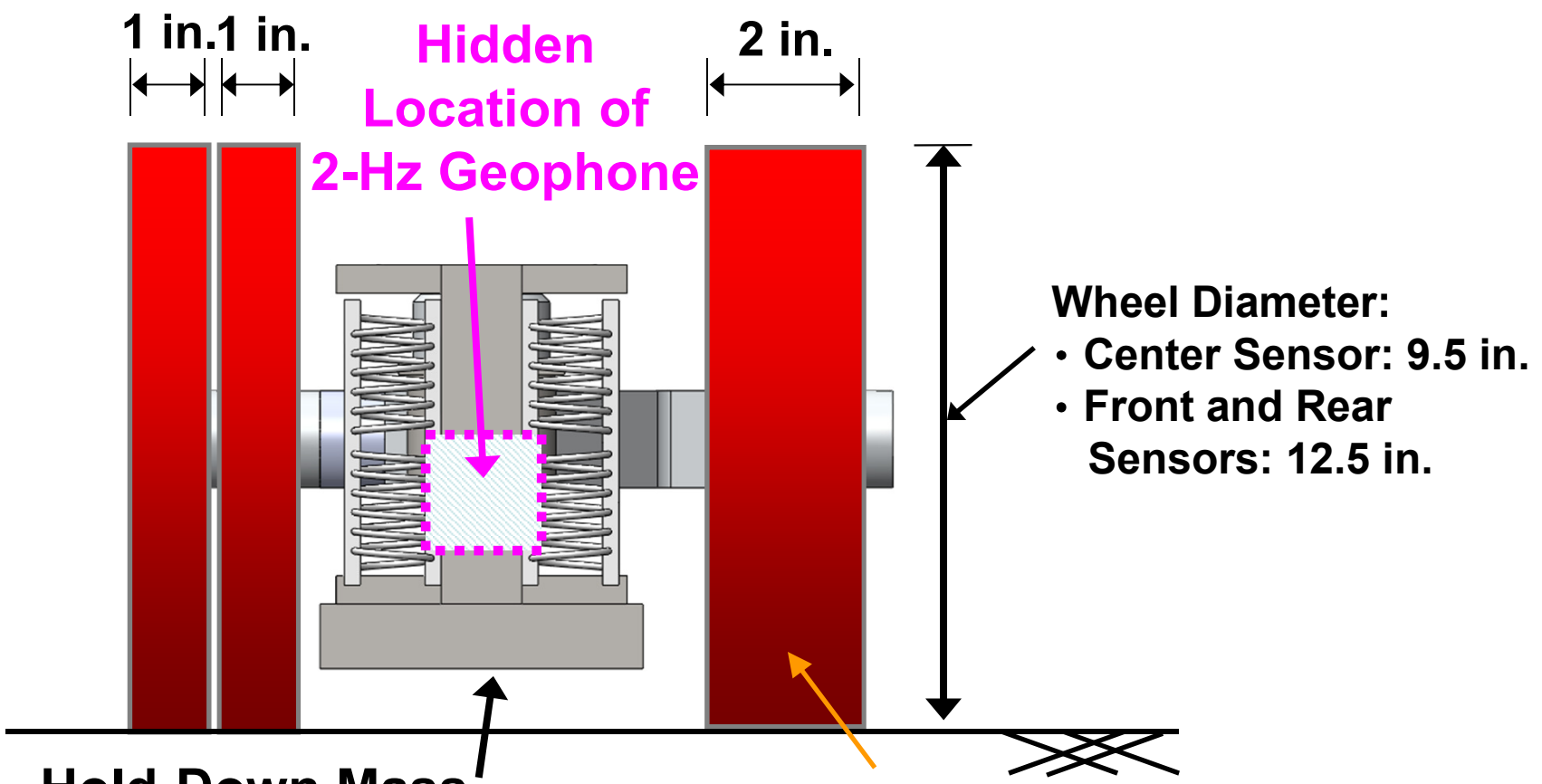
TPAD RDD Forcing Function



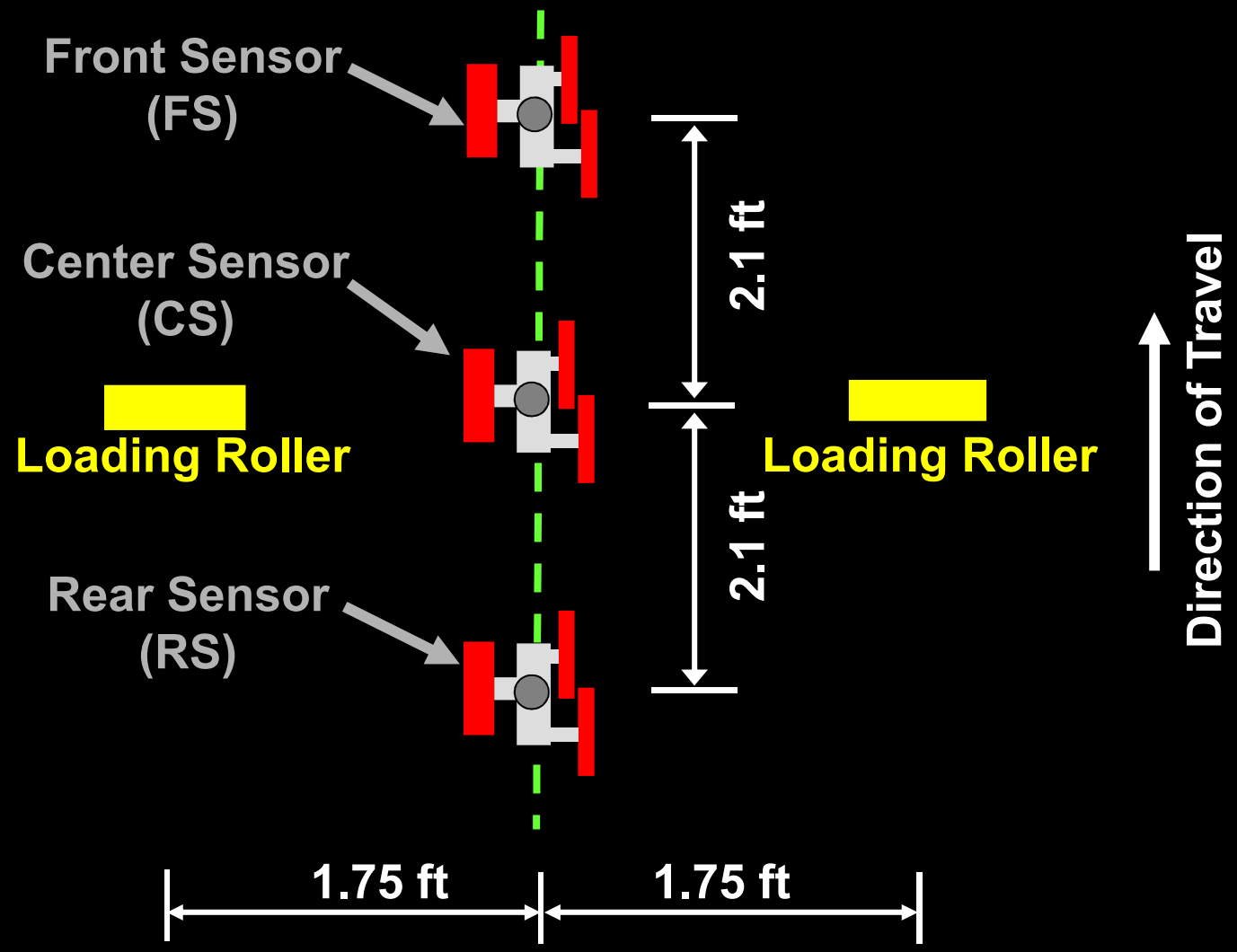
Notes:

1. Typical loading frequency = 1/T = 30 Hz
2. Maximum hold-down force ≃ 14 kips
3. Measuring dynamic pavement deflections due to F_d
4. Measurements accuracy approx. 0.05 mils while moving

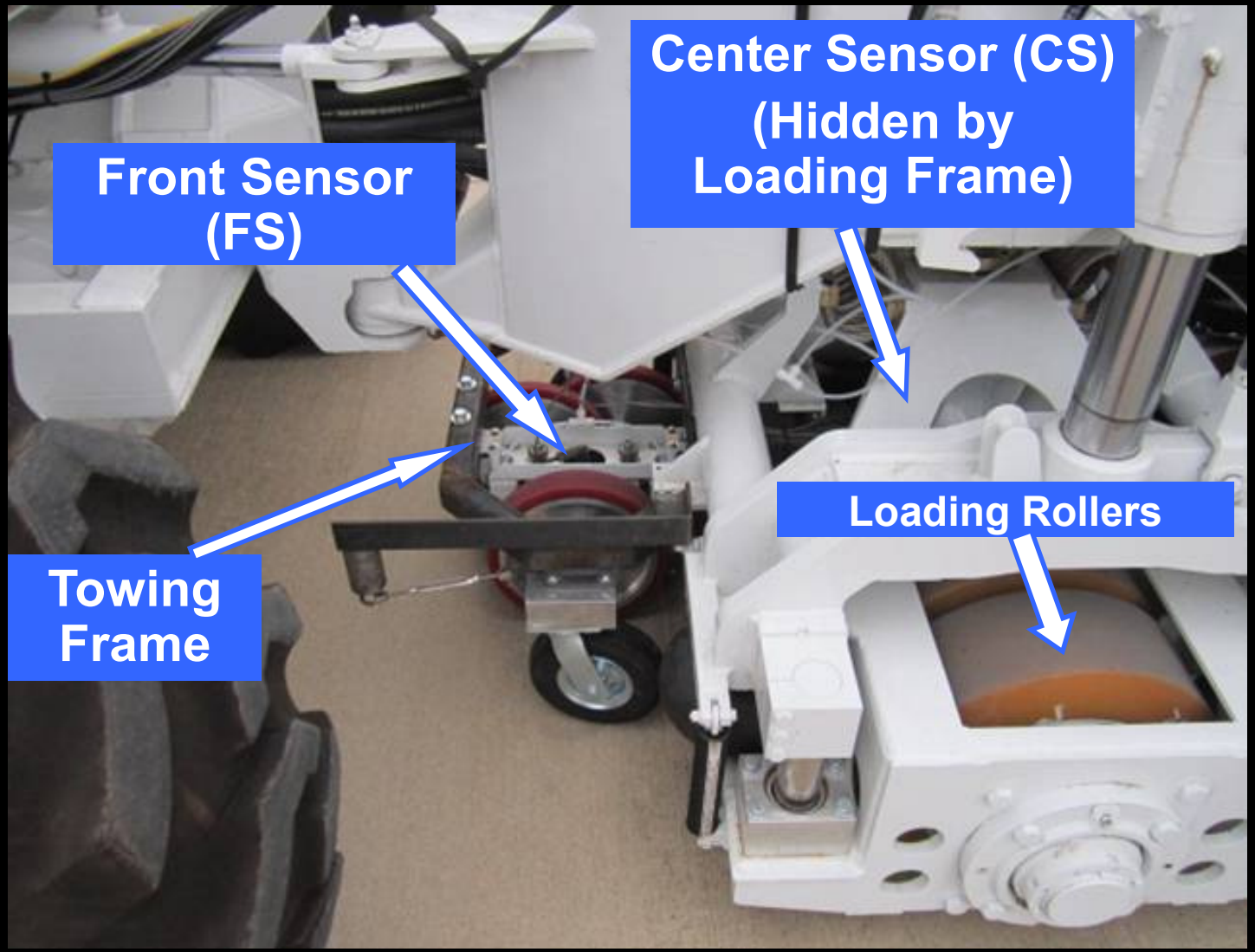
TPAD Rolling Sensor



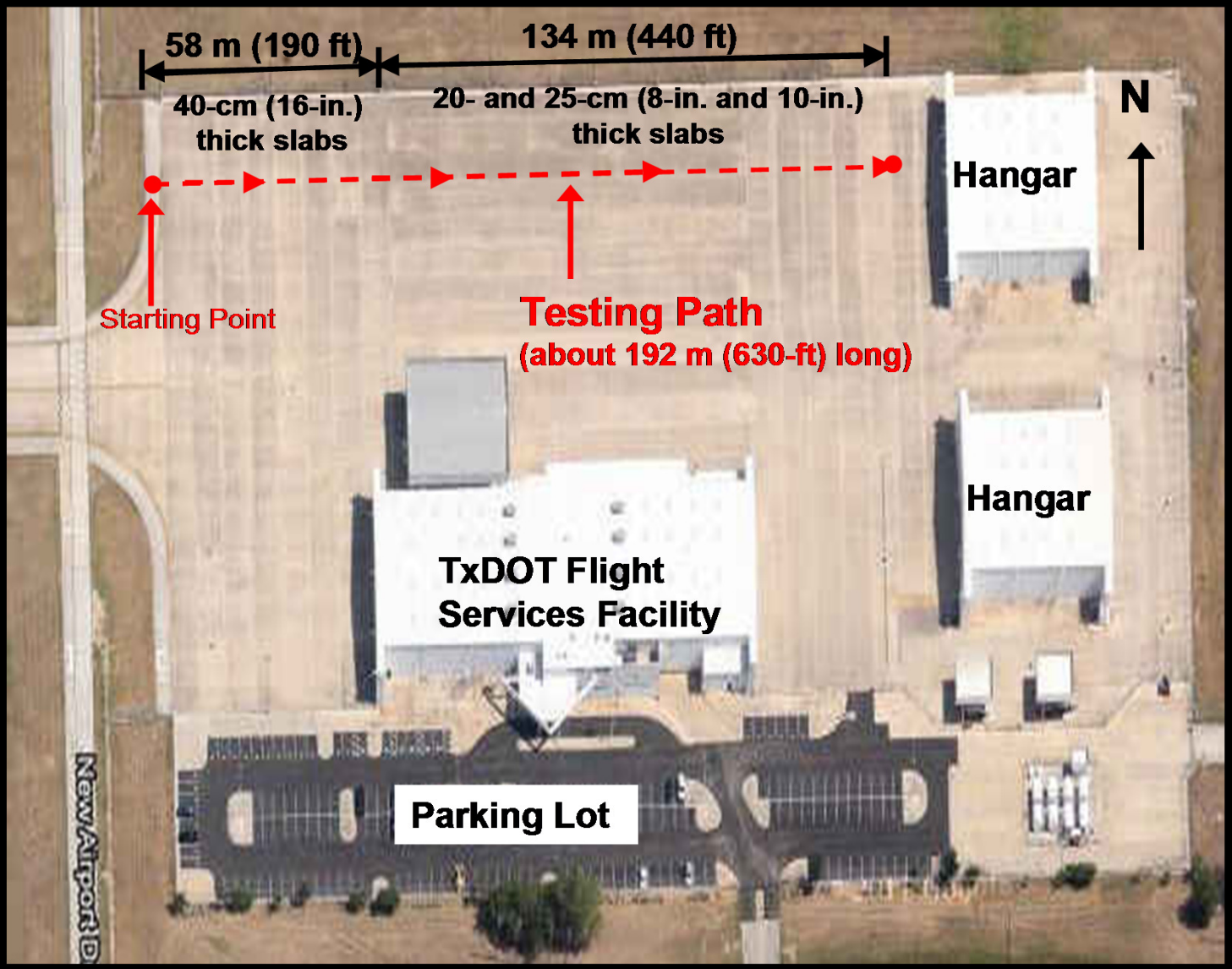
Arrangement of Three TPAD Rolling Sensors



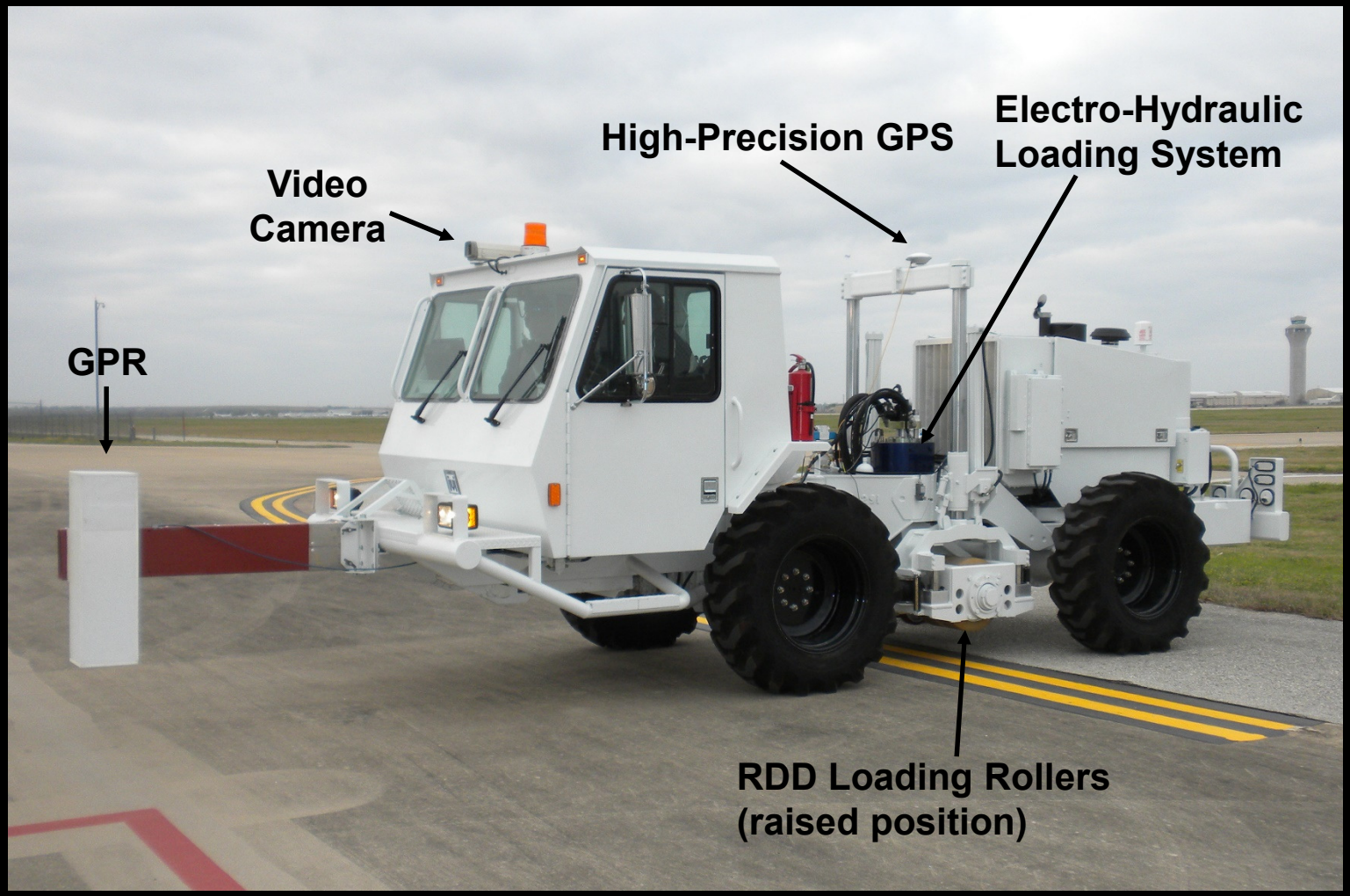
RDD Portion of TPAD



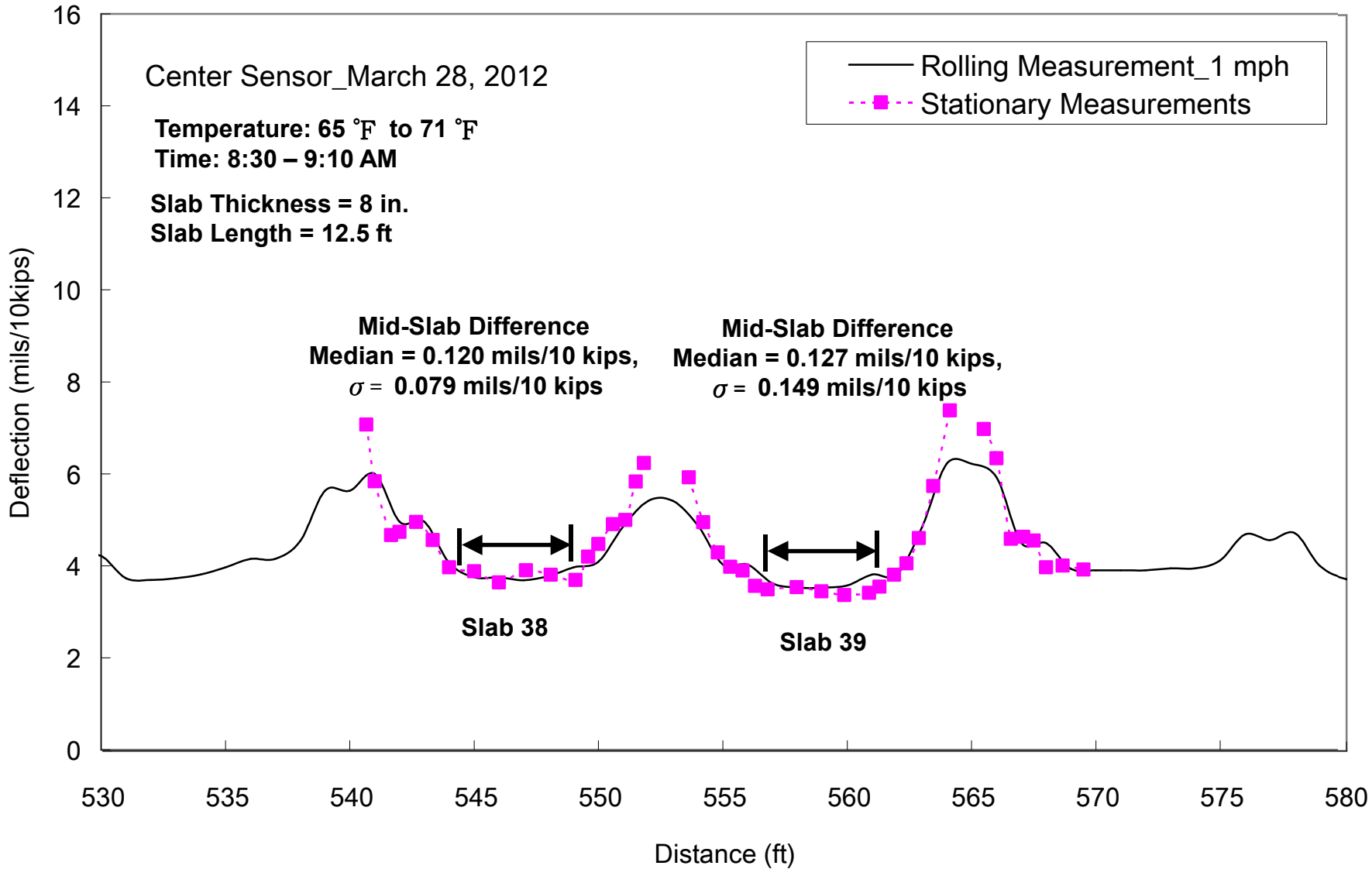
3. Testbed at TxDOT Flight Services Facility



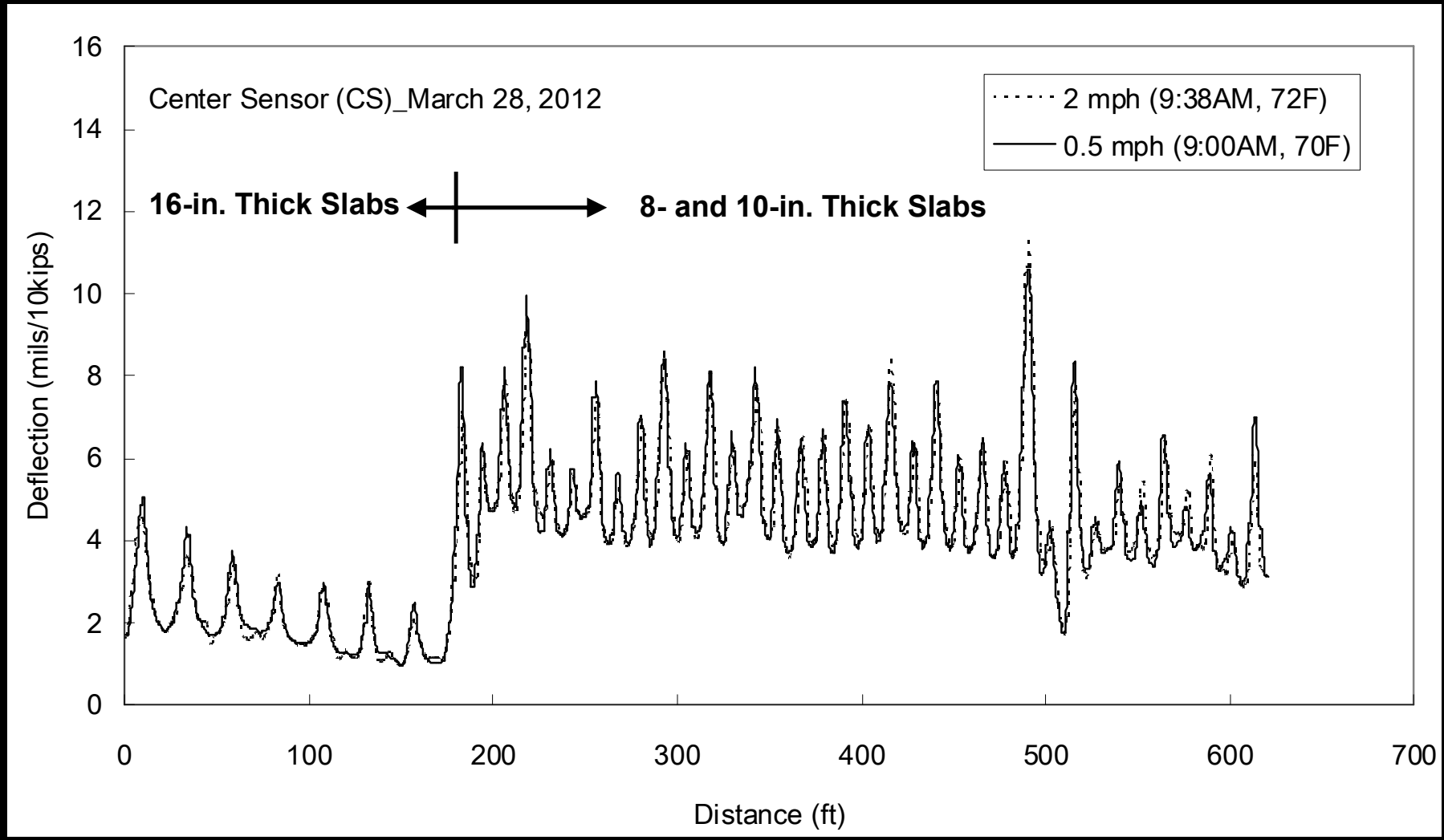
TPAD at TxDOT Flight Services Facility in Austin



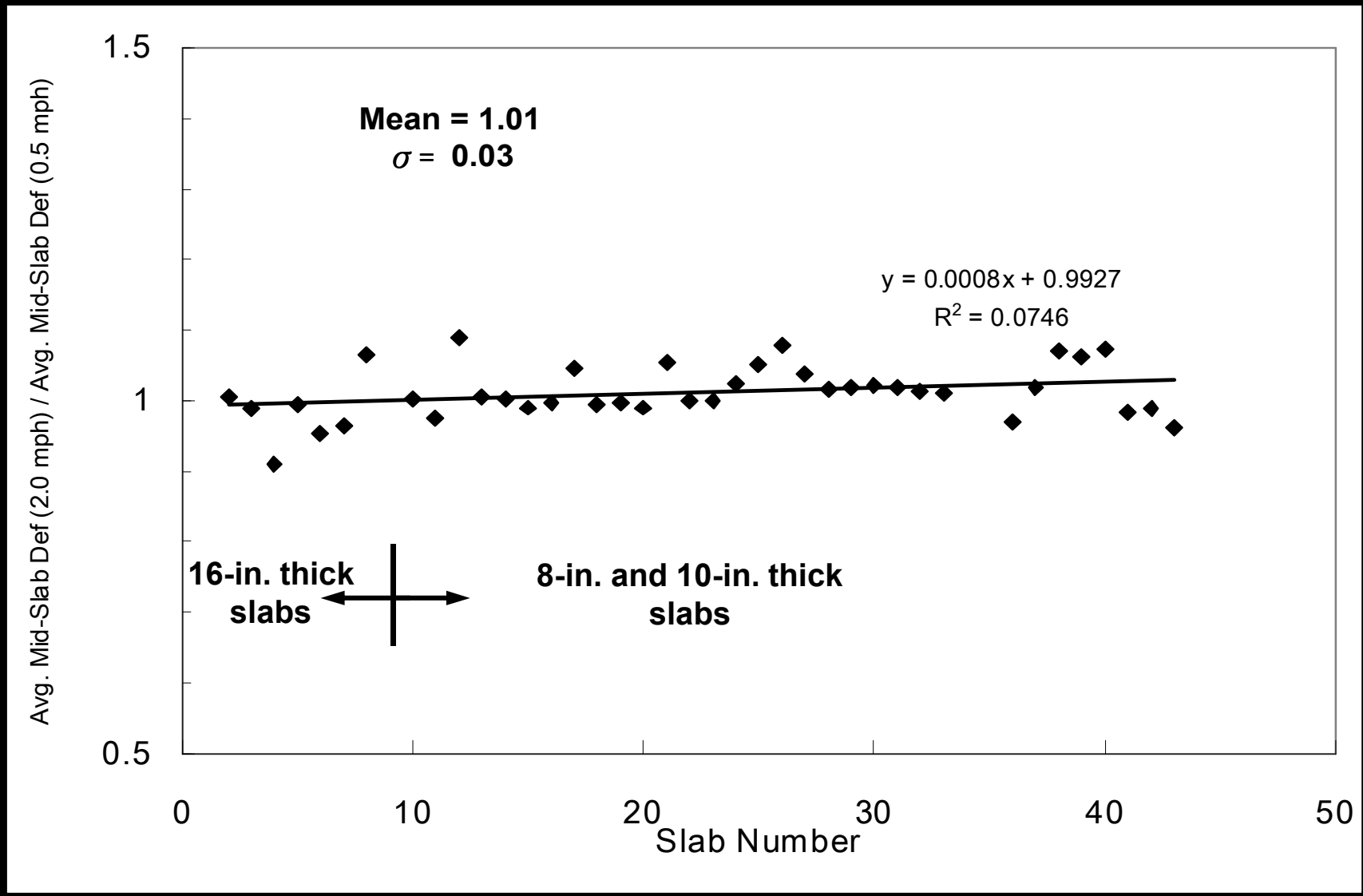
Stationary and Continuous Deflections



Continuous RDD Deflection Profiles at 0.5 and 2 mph

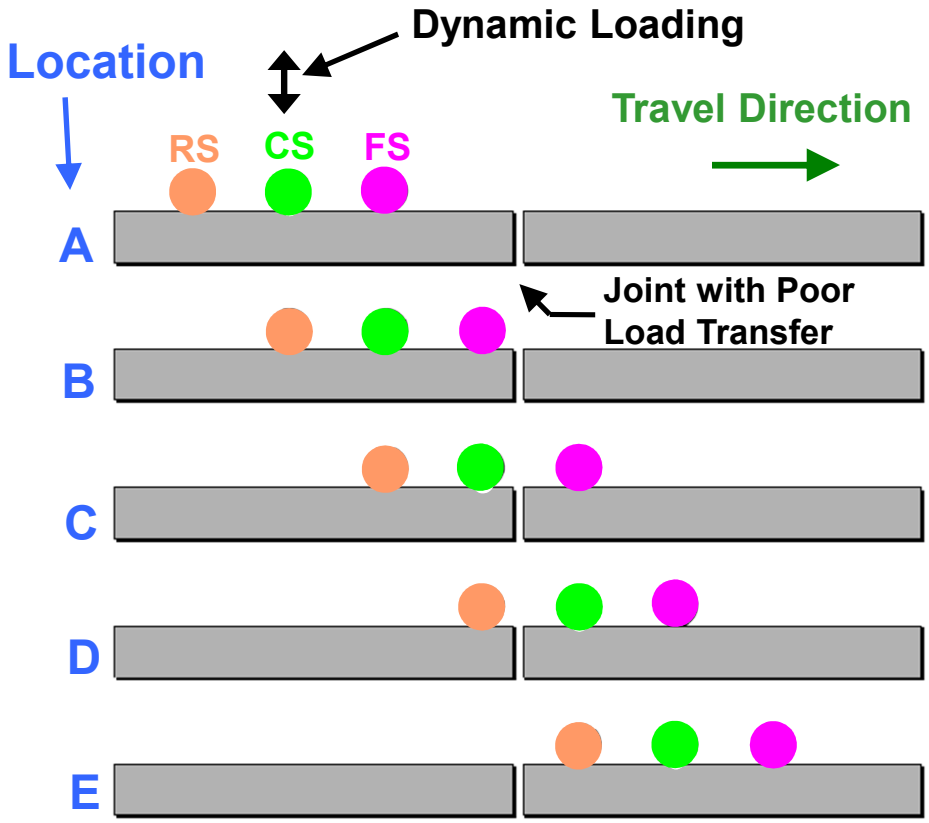


Average Mid-Slab Deflection Comparison at 0.5 and 2 mph

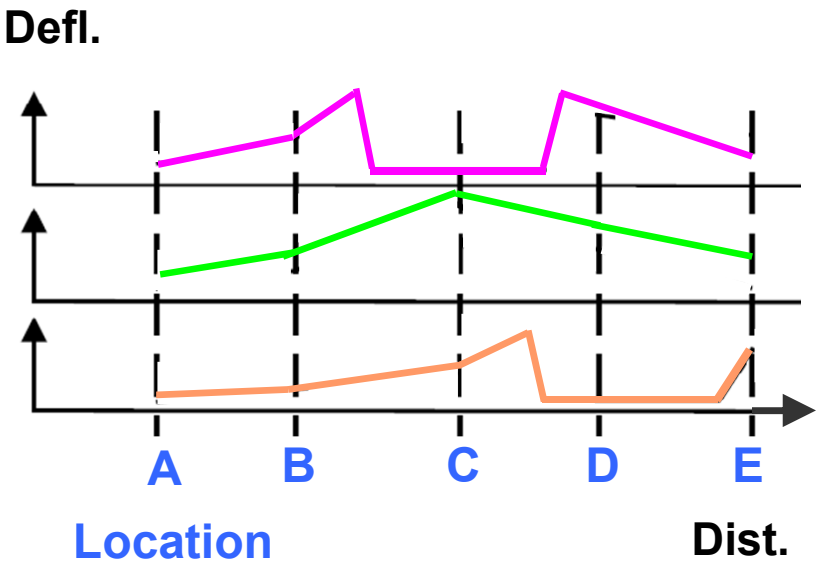


Deflections Associated with Sensors around Poor Load Transfer Joint

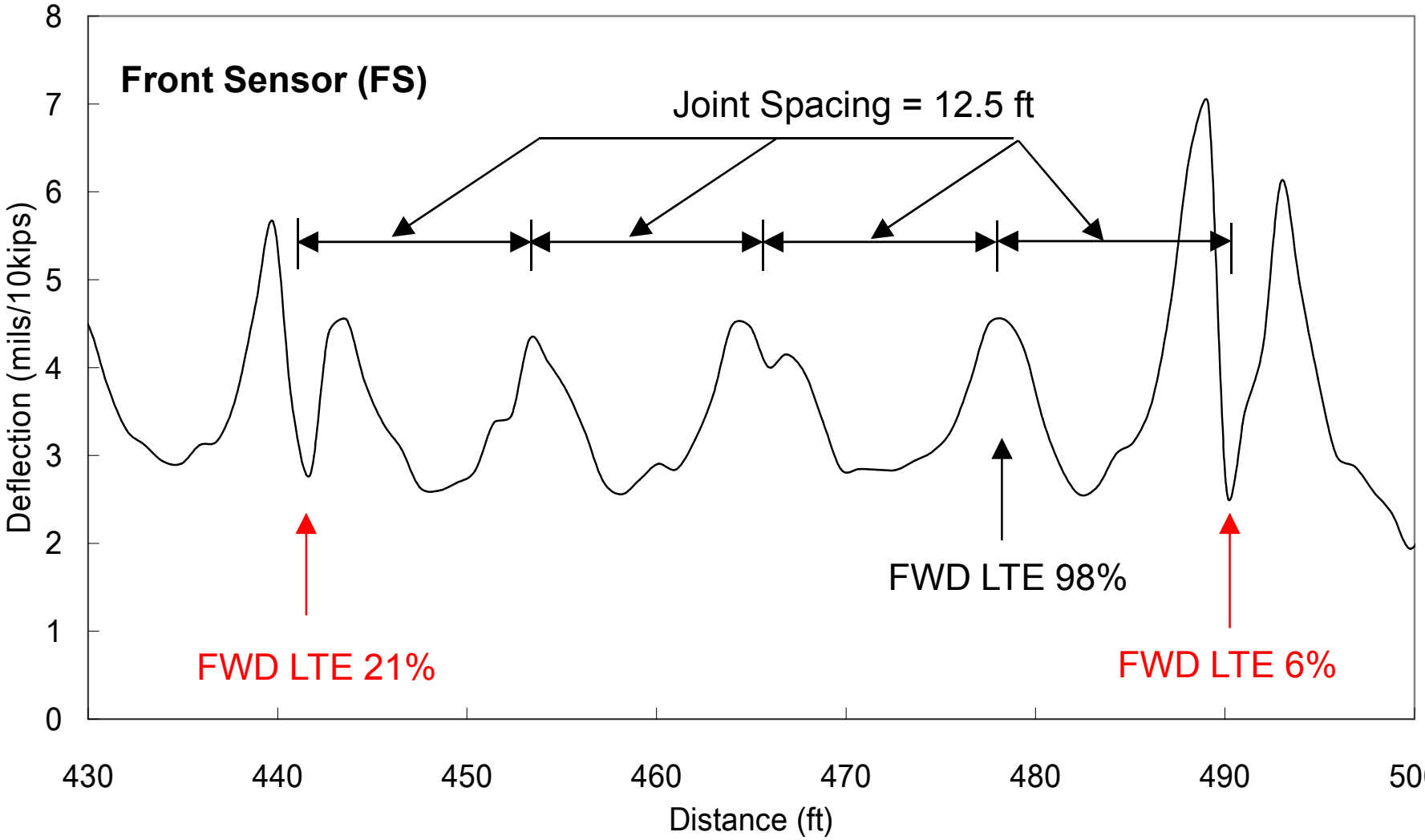
Locations of Sensors as They Traverse a Joint



Deflection Patterns Associated with Each Sensor Traversing a Joint



Expanded FS Deflection Profile



4. Concluding Remarks

- New, multi-function pavement profiling system was developed with TxDOT funding.
- Development was a joint effort (TxDOT, CTR and TTI).
- New system is called the TPAD (Total Pavement Acceptance Device).

4. Concluding Remarks – con'd

- The RDD function of the TPAD involves three rolling sensors and permits measuring continuous deflection profiles at 2 to 3 mph.
- Rolling deflections of mid-slab areas are very similar to stationary deflections.
- Deflection underestimations occur at joints because of averaging during data processing.
- The front sensor can be used effectively to identify joints with low load transfer.

Acknowledgements

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Thank You

Questions?